Memory Strategies

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Disclaimer

If questioned, we can all probably describe a strategy we employed to try to remember relevant information (e.g., I rehearsed the definitions, I generated examples of the definitions) for some future event (e.g., a test). Essentially, memory strategies help manage encoding and retrieval demands given a particular memory task. In the example of a test, we must figure out how to remember all the material covered on the test. This task requires that our studying allow us to discriminate the information at test. Famous psychologist, Endel Tulving, demonstrated the Encoding Specificity Principle that posits that the more similar the retrieval cues are at test to encoding the more likely the information will be retrieved. In essence, specificity of cues allows for discrimination between potential memory traces so the correct memory trace is retrieved at test.

On the face of it, it sounds simple. However, the test is in the future. Consequently, we must know in the present when we are studying what cues we will need in the future. In reality, it is not a simple task. Thus, one way to handle this situation is to use strategies. One way to conceptualize strategies is to think of strategies as an intersection between working memory (WM) and long-term memory (LTM) because knowledge about various strategies are stored in LTM. This knowledge is then employed in a person's attempt to encode the target information and designate retrieval cues.

Consequently, to understand memory strategies one must understand memory. For an excellent in-depth review of memory, please see Baddeley, Eysenck, and Anderson (2015) (full citation below). In our discussion, we will review memory, several memory strategies, and some interesting recent findings in memory strategy research. These recent investigations are examples of what questions scientists are currently pursuing. However, our discussion is not an exhaustive review of the area. We will begin with LTM because knowledge about strategies is stored there.

LTM refers to people's ability to store information over longer periods of time. Information in LTM can be information from events in our lives (i.e., episodic memory), general knowledge (i.e., semantic memory), and how to do things (i.e., procedural knowledge). For instance, if you have a specific memory about when you tried to use a strategy, that type of memory is an episodic memory. Your knowledge about the effectiveness of a strategy would be semantic memory. How to carry out a specific strategy would be procedural knowledge.

In contrast, WM is the term used by psychologists to refer to people's ability to process and maintain relevant information in the short-term. Non-psychologists frequently use the term short-term memory (STM); however, WM is a more accurate conceptualization of memory ability over the short-term. For example, as you are reading this sentence, you are processing

words but you also have to maintain the meaning from previous sentences and integrate new information to continue to comprehend the material. WM and LTM can interact with one another as we see with strategies.

Why rely on strategies stored in LTM? WM has limitations in attention, which is a person's ability to continue processing relevant information. A person can only focus on a certain amount of information at a time. In order to focus on relevant information, an individual must keep interfering information (i.e., information that could block access to needed information) out of the focus of attention. People can rely on strategies to help complete a task (e.g., using rehearsal to study for a test) given the constraints of WM. And, strategies can help us retrieve information from LTM into WM.

There are different types of strategies. Rehearsal is a simple but effective means to maintain relevant information in WM and transfer that information into LTM. The method of loci involves a person imagining a location and the objects in various locations. For instance, if a person needed to remember the words, "cat, hat, shoe, apple, rose, locket," one could imagine various items located in different places in her living room. Then, the person would mentally look in that location in her living room. By using her own living room, the person is relating the information to what she has stored in LTM.

Other strategies rely on pre-existing information in LTM by focusing on organization techniques. Chunking is a strategy in which people group items together to create a meaningful unit. For example, the string of letters, UCLASCUBAMOMSEAT, could be organized into the following chunks: UCLA, SCUBA, mom, seat. By creating chunks, this strategy helps with the WM attentional constraints. Another strategy that relies on organization is the story mnemonic, which also focuses processing on the meaning of the word. A person creates a story using the

unrelated words in the correct serial order. Using the words from the method of loci example, a person could remember the words by saying to himself, “A CAT wearing a HAT slept in the house shaped like a SHOE on APPLEROSE lane before going out to steal a LOCKET.”

Similarly, strategies that rely on maximizing distinctiveness—considering how items are different in the context of similarity—can help LTM retention. For example, if individuals considered how apples, oranges, bananas, and avocados are different, then the information is better remembered. Distinctiveness is helpful because the retrieval cue is associated with fewer potential memory traces.

The use of strategies gradually appears during childhood and adolescence. Scientists studying development of memory have investigated whether increases in short-term memory capacity during childhood can be attributed to strategies such as rehearsal. An interesting focus of debate has been whether the memory changes that a child experiences as they get older are quantitative or qualitative changes in rehearsal. Given that many very young children do not exhibit the same memory effects as adults, many scientists have come to the conclusion that children experience a qualitative shift around the age of seven. Specifically, children older than 7 years use rehearsal that results in a re-coding of visually presented information into a verbal code (e.g. a picture of a duck→ duck) similar to adults. Younger children do not do this. However, scientists point out that the picture is more nuanced and complex.

Miller, McCulloch, and Jarrold trained 6 and 8-year-olds to use a rehearsal and interactive imagery strategy. As expected, the strategy groups outperformed the control group. However, what was notable was that both age groups were able to benefit from both types of strategies. This effect was impressive considering the children were not explicitly instructed on how to use rehearsal or interactive imagery. Instead, a visual hint was provided on screen during

training. Moreover, disrupting the use of a verbal strategy seemed to have a greater detrimental effect on memory than disrupting a visual strategy. Furthermore, John and Aslan found that in the absence of a strategy training phase only 12 to 14-year-olds exhibited the effects of strategy disruption when given the opportunity to test themselves during the study phase. Younger children—10 and younger—did not exhibit an effect of strategy disruption regardless of whether they were allowed to test themselves. John and Aslan concluded that part of the answer might be due to the lack of a retrieval plan in young children.

Children appear to differentially benefit from strategy use depending on their age and training. However, both adults and children can exhibit difficulties in using strategies because strategy use can tax memory. Production deficiency results when people do not use a strategy (i.e., spontaneous strategy use) but can use the strategy when prompted. People also sometimes will use a strategy but not benefit from the strategy (e.g., utilization deficiency). Utilization deficiencies might be due to the particular strategy exceeding the cognitive resources of the person.

Considering the potential benefits of strategies, there are particular educational applications. Simons, Metzger, and Sonnenschein asked children what their definitions of 5 learning processes implicated in schooling were. The 5 processes were attention, ignoring distractions, persistence, organization, and planning. Through a review of the research literature, they identified common components of these tasks and coded the children's responses. They found that the number of components mentioned in the children's definitions for distractions, organizing, and planning predicted children's performance on the picture memory task. This finding is consistent with earlier findings that when teachers discuss memory and strategies with their students the children do better on memory tests and will employ strategies. Although still

preliminary, Simons and colleagues' research support the need for teaching students how to learn using strategies and how cognitive processes operate in addition to the subject material.

Further Reading

Baddeley, A., Eysenck, M. W., & Anderson, M.C. (2015). Memory. 2nd ed. London: Psychology Press.

Miller, S., McCulloch, S. & Jarrold, C. (2015). The development of memory maintenance strategies: Training cumulative rehearsal and interactive imagery in children aged between 5 and 9. *Frontiers in Psychology*, 6, 1-10. Doi:10.3389/fpsyg.2015.00524

Simons, C., Metzger, S. R., & Sonnenschein, S. (2020). Children's metacognitive knowledge of five key learning processes. *Translational Issues in Psychological Science*, 6 (1), 32-42. http://dx.doi.org/10.1037/tps0000219